

AlGaAs Flip-Chip PIN Diode 100 MHz to 50 GHz

**MA4AGFCP910
V1**

Features

- Lower Series Resistance, 5.2Ω
- Ultra Low Capacitance, 18 fF
- High Switching Cutoff Frequency, 50 GHz
- 3 Nanosecond Switching Speed
- Driven by Standard TTL
- Silicon Nitride Passivation
- Polyimide Scratch Protection

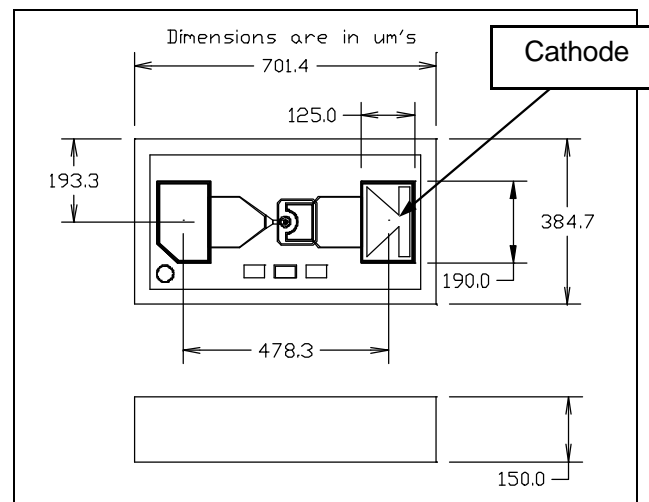
Description and Applications

M/A-COM's MA4AGFCP910 is an Aluminum Gallium Arsenide Flip-Chip PIN diode. These devices are fabricated on OMCVD epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. The diodes exhibit an extremely low RC Product, (0.1 ps) and 3nS switching characteristics.

They are fully passivated with silicon nitride and have an additional layer of a polymer for scratch protection. The protective coatings prevent damage to the junction and the anode airbridge during handling.

The 20 fF capacitance of the MA4AGFCP910 allows use through mmwave switch and switched phase shifter applications. This diode is designed for use in pulsed or CW applications, where single digit nS switching speed is required. For surface mount assembly, the low capacitance of the MA4AGFCP910 makes it ideal for use in microwave multithrow switch assemblies, where the series capacitance of each "off" port adversely loads the input port and affects VSWR.

Top View Shown Is With Diode Junction Up



Absolute Maximum Ratings @ $T_A = +25^\circ\text{C}$ (Unless Otherwise Noted) ¹

Parameter	Absolute Maximum
Operating Temperature	-65 °C to +125 °C
Storage Temperature	-65 °C to +150 °C
Junction Temperature	+175 °C
Dissipated RF & DC Power	50 mW
RF C.W. Incident Power	+ 23 dBm C.W.
Mounting Temperature	+300 °C for 10 seconds

1. Operation of this device above any one of these parameters may cause permanent damage.

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Electrical Specifications @ $T_A = 25\text{ }^{\circ}\text{C}$

Parameters and Test Conditions	Symbol	Units	1 MHz & DC Specifications			10 GHz Reference Data ^{1,2}		
			Min.	Typ.	Max.	Min.	Typ.	Max.
Total Capacitance at -5 V	Ct	pF		0.018	0.021		0.018	.021
RF Resistance at +10 mA	Rs	Ω					5.2	6.0
Forward Voltage at +10 mA	Vf	Volts		1.33	1.4			
Reverse Breakdown Voltage at 10 μA ³	Vb	Volts	50	75				
Minority Carrier Lifetime	τ_L	nS		4.0				

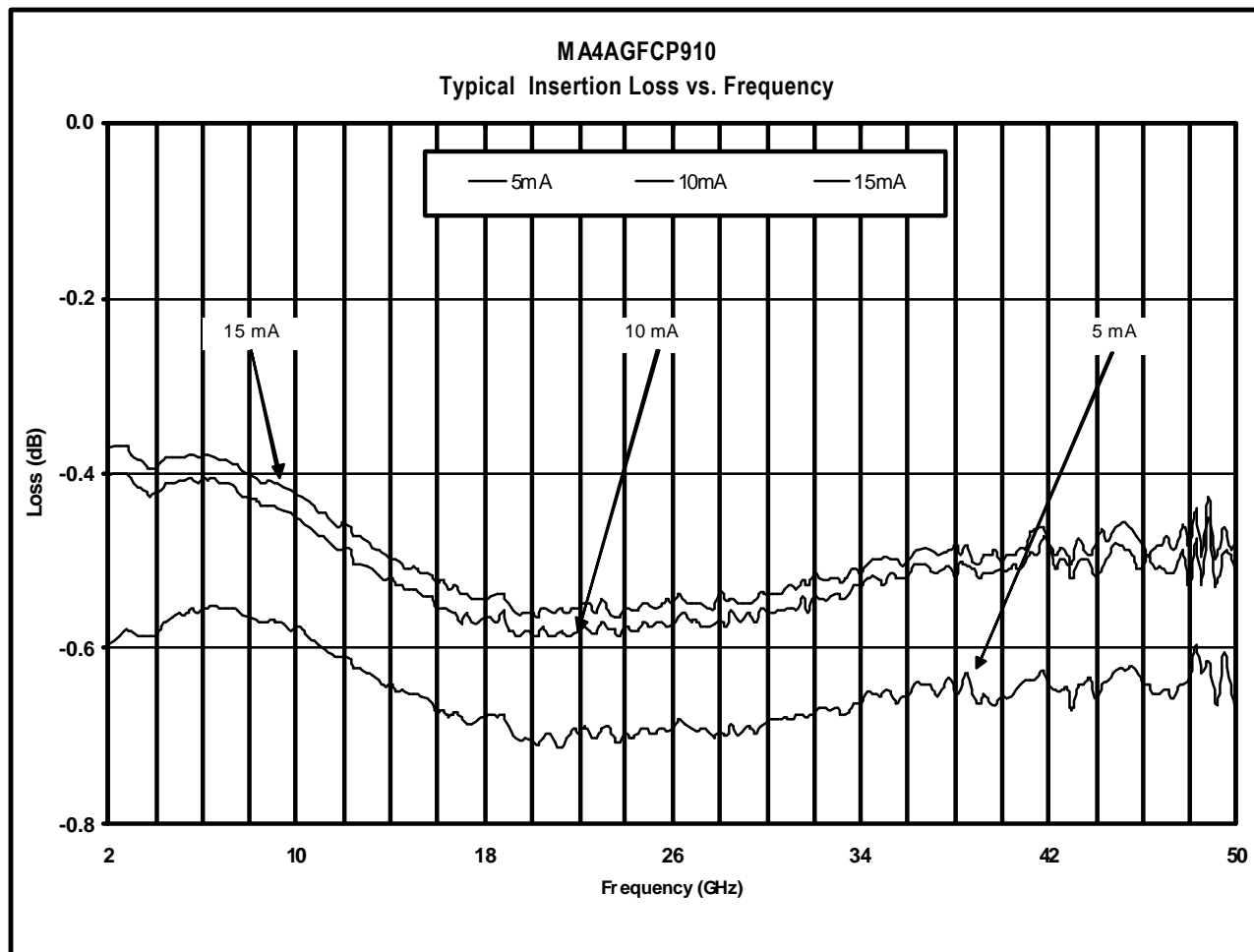
NOTES:

1. Capacitance is determined by measuring Single Series Diode Isolation in a 50 ohm line at 10 GHz.
2. Forward Series Resistance is determined by measuring Single Series Diode Insertion Loss in a 50 ohm line at 10 GHz
3. Reverse current will not exceed 10 microamperes at the Maximum Voltage Rating.

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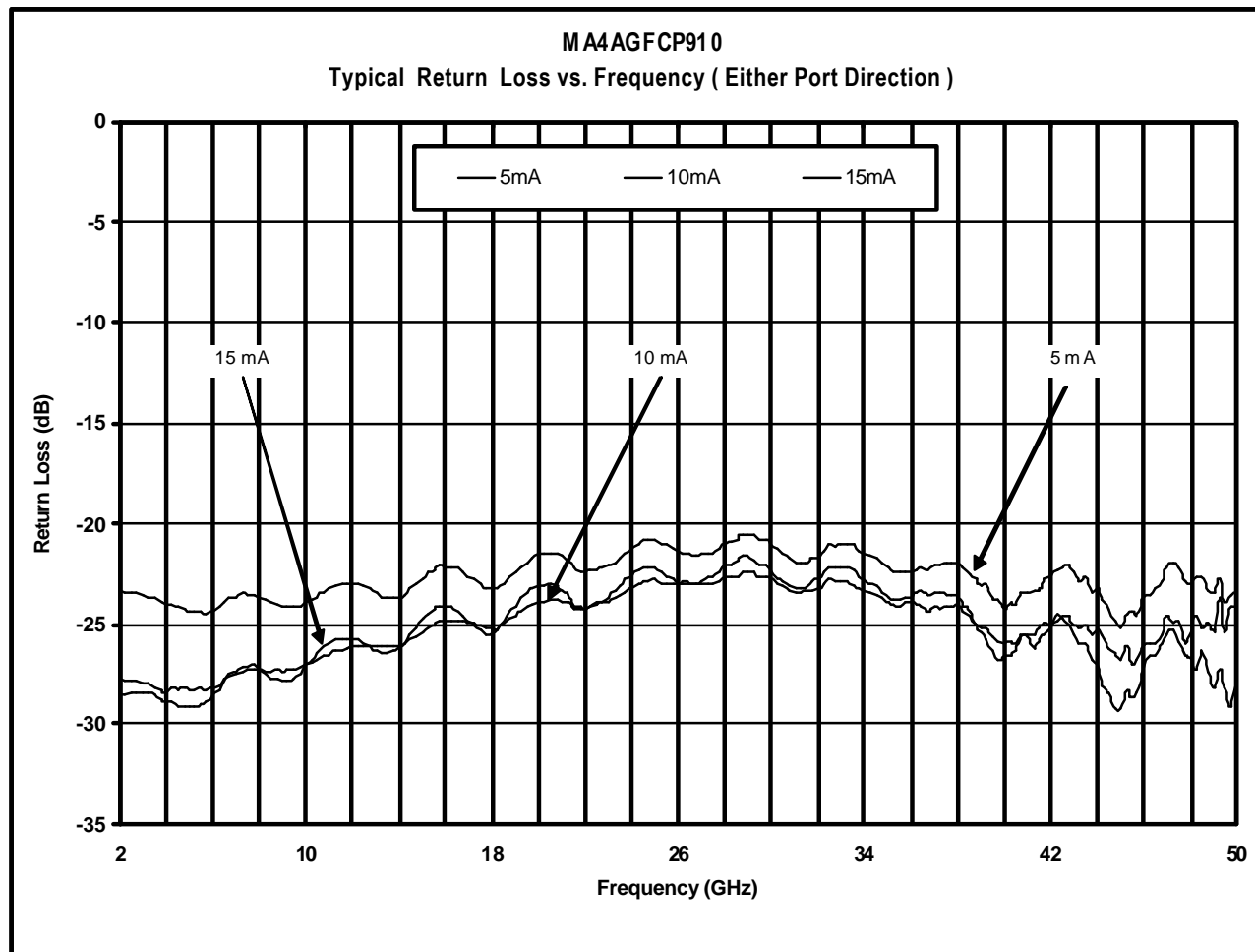
Typical RF Performance



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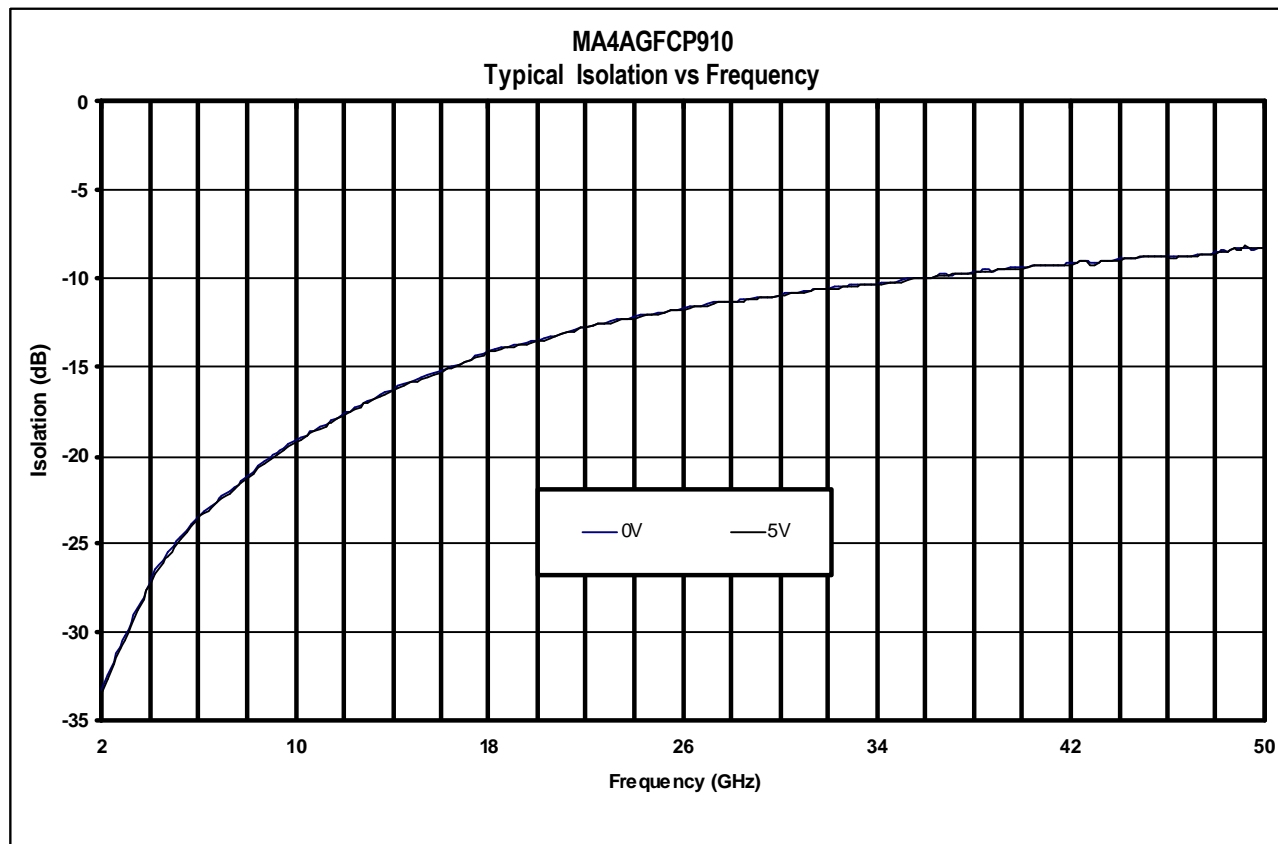
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V1**Assembly Considerations**

The following precautions should be observed to avoid damaging these chips.

Cleanliness

These chips should be handled in a clean environment. Do not attempt to clean die after installation.

Static Sensitivity

Gallium arsenide PIN diodes are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices. These devices are rated Class 0, (0-199V) per HBM MIL-STD-883, method 3015.7 [C = 100pF \pm 10%, R = 1.5kW \pm 1%]. Even though tested die pass 50V ESD, they must be handled in a static-free environment.

General Handling

These devices have a polymer layer which provides scratch protection for the junction area and the anode air bridge. Die can be handled with plastic tweezers or picked and placed with a #27 tip vacuum pencil.

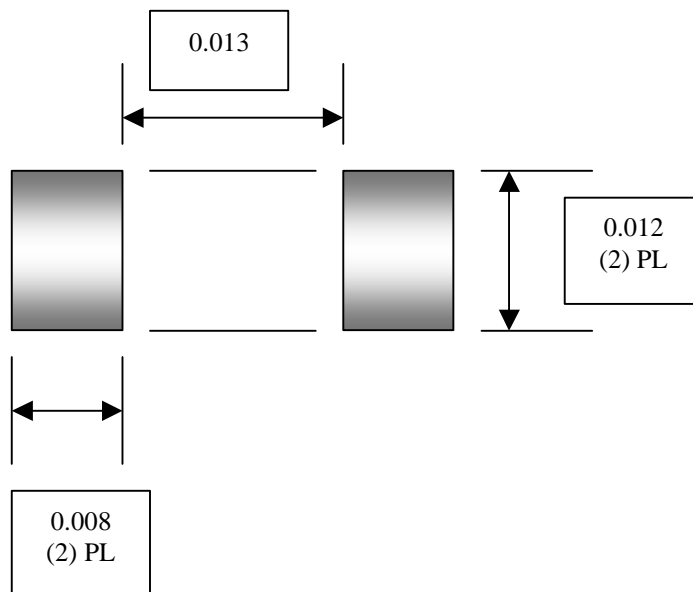
Assembly Requirements using Electrically Conductive Ag Epoxy and Solder

These chips are designed to be inserted onto hard or soft substrates with the junction side down. They should be mounted onto silk-screened circuits using Electrically Conductive Ag Epoxy, approximately 1-2 mils in thickness and cured at approximately 90°C to 150 °C per manufacturer's schedule. For extended cure times > 30 minutes, temperatures must be below 200 °C.

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Circuit Mounting Dimensions (Inches)



Ordering Information

Part Number	Package
MA4AGFCP910	Die in Carrier
MA4AGFCP910-T	Tape/Reel
MA4AGFCP910-W	Wafer on Frame